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ABSTRACT

Presented at the Montgomery County (PA) Intermediate Unit Conference on Learning Disabilities in the Secondary Schools, 1975, the document presents an interpretive literature review of the speech, language, and characteristics of the learning disabled adolescent. Aspects covered include definitions of language, language disabilities, and the learning disabled; sociocultural factors in language and learning disabilities; assessment of language and speech; language and speech characteristics of the learning disabled adolescent; and intervention strategies. The authors' orientation to language programing--based on in situ assessment of the child's linguistic strategies and a task-analytic approach to the development of linguistic skills that consider the interaction of teacher, child, material, and situational variables--is also discussed. (DLS)

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LANGUAGE AND SPEECH DIFFICULTIES OF THE ADOLESCENT LEARNING DISABLED[1]

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LD Series #2

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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This paper presents an interpretive literature review of the speech, language, and characteristics of the adolescent learning disabled. It should be noted at the outset that an intensive review of the literature in psychology and education revealed a paucity of research pertaining to the language and speech problems of the adolescent learning disabled. Focus centers on the following areas: (1) definitions of language, language disabilities, and the learning disabled; (2) assessment of language and speech; (3) language and speech characteristics of the adolescent learning disabled; (4) intervention strategies; and (5) implications for further research and programming. The present authors' own conceptualization of the topics will be presented.

Definitions of Language

It is important to define the construct of language before attempting to assess various approaches dealing with the language problems of the adolescent learning disabled. Language has been defined in many ways by many investigators with varying degrees of precision. These definitions, in part, are dependent upon the investigators' disciplines. For instance, Carroll (1953) defines language from a linguistic point of view as:

> a structured system of arbitrary vocal sounds which is used, or can be used, in interpersonal communication by an aggregation of human beings, and which rather exhaustively catalogs the things, events, and processes in the human environment (p. 10).

In this instance, Carroll sees language as an internalized system or code that the individual has acquired and is able to use in his/her speech communication. This emphasis on coding is operative in other linguistic definitions of language, e.g., Ervin-Tripp (1966). Speech on the other hand, is the behavioral manifestation of language, i.e., communication or overt verbal performance.

From a psycholinguistic, transformational-generative point of view, Chomsky (1957, 1965) sees language as an abstract system of knowledge in which sound and meaning are associated grammatically in a specific and complex manner. According to Chomsky and his associates (McNeill, 1970; Slobin, 1971), when the individual acquires a langauge he/she acquires an elaborate system of syntactic, semantic, and phonological rules. These rules represent the basic competence or abstract linguistic knowledge that underlies the generative nature of the individual's performance. A great deal of the current research and theorizing in language comprehension and production is dependent on recent work in psycholinguistics. (For a comprehensive review of the literature, see Fillenbaum, 1971; McNeill, 1966, 1970; Menyuk, 1971; Olson, 1970; Slobin, 1971, 1972.) Finally, from an applied linguistic point of view, language is a social tool or means of communication used by people to carry on the affairs of society (Dever, in preparation).

In contrast, from a learning theory view, Skinner (1957) and Staats and Staats (1968), apply S-R operant conditioning principles to discuss language and language acquisition. According to Skinner, specific verbal or linguistic behaviors are acquired or learned through a combination of operant conditioning and response generalization. Similarly, Staats and Staats (1968) employ such behavioristics principles as association-formation and stimulus and response generalization in their account of language acquisition. Hence, in this view, language is actually a form of operant behavior which requires contiguous immediate reinforcement for its maintenance. However, notions of simple learning models such as Skinner's and mediated learning

models (Mowrer, 1954 ; Osgood, 1957) have been found deficient in their attempt to account for language acquisition (Chomsky, 1959, 1968; Fodor, 1966; McNeill, 1966, 1970). Wardhaugh (1972) provides an excellent review and comparison of linguistically oriented and learning oriented theories of language acquisition.

On the other hand, it is important to stress the distinction between speech and language. For instance (Carroll (1967) states that when we are referring to speech, "we are, or should be referring, to the actual behavior of these individuals in using language, the amount of talking, the conditions under which talking is elicited, and so forth" (p. 43). Hence speech is the behavioral manifestation of language, i.e., communication or overt performance.

Marge (1972) distinguishes the four main components of language behavior: listening, speaking, reading, and writing. He, like others, emphasizes that language is composed of phonological, morphological, syntactic, and semantic components which must be acquired to understand and speak a given language. Various approaches reflecting each of these components of language and language behavior are found in studies dealing with the language and speech difficulties of learning disabled adolescents.

Definitional Problems in Learning Disabilities

Identification, assessment, and programming for the learning disabled has been, and continues to be, a subject of tremendous complexity, diversity, and ambiguity. This results in part from professional influence. Despite recent efforts to clarify what constitutes a learning disabled child or adolescent, a considerable discrepancy of opinion exists within the professional cadre.

Confusion has been exacerbated by the entry of many disciplines into the field, e.g., medicine, speech and hearing, special education, optometry, and reading specialists. Communication among these disciplines is complicated by the large number of terms used to describe the learning problems. For example, Cruickshank reported in 1968 some 43 terms found in the literature to describe children exhibiting similar characteristics (McDonald, 1968).

Definitional problems. Despite problems in definition and terminology, the National Advisory Committee on Handicapped Children (USPHS, 1969) has formulated a widely accepted definition for specific learning disabilities. The definition was incorporated into the Children with Specific Learning Disabilities Act of 1969, PL 91-230, the Elementary and Secondary Educational Amendments of 1969:

> Children with special learning disabilities exhibit a disorder in one or more of the basic psychological processes involved in understanding or using spoken or written language. These may be manifested in disorders of listening, thinking, talking, reading, writing, spelling, or arithmetic. They include conditions which have been referred to as perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, developmental aphasia, etc. They do not include learning problems which are due primarily to visual, hearing, or motor handicaps, to mental retardation, emotional disturbance, or to environmental disadvantage.

While educators may have "breathed a sigh of relief" that such an extensive definition had been formulated, concern has arisen over many aspects of the definition. For example, the definition clearly enumerates what a learning disabled child or adolescent is not (Gearheart, 1973; Lerner, 1971; Myers & Hammill, 1969). Excluded are children and youth who have apparent learning problems primarily caused by sensory deficits, motor difficulties, mental retardation, emotional disturbance, or environmental disadvantage. This exclusion of many exceptional children and adolescents from the umbrella of specific

learning disabilities may be administratively advantageous, but it may also dictate unnecessary differences in programming, especially when procedures are incorporated into mandates for state legislation. The process of exclusion necessitates a new category of exceptionality with the implicit assumption that programming must be significantly different from instruction received by other children, or adolescents, normal or exceptional.

Moreover, the PL 91-230 definition is not operational. According to Wiederholt (1974), professionals, parents, and legislators seek an operational definition that clearly identifies the learning disabled by using standardized tests and cut-off criterion scores. Wiederholt believes that because of the lack of valid, reliable instruments and identification procedures, the field is no closer to such a definition than it was more than a decade ago when Kirk (1963) introduced the learning disabled population in general terms. Summarizing the problems of defining learning disabilities, Wiederholt states:

> It is unlikely that this problem of definition will be solved in the near future. In the meantime, however, the term "learning disabilities" will probably continue to mean a different variety of dysfunctions to different people, with accompanying incidence figures ranging anywhere from less than 1% to over 20% of the school-age population. Schools will also probably continue to include in this category children who are variously underachievers, emotional- or conduct-disordered, or dull-normal pupils who are failing in school--none of whom clearly fit under another classification system in special education, e.g., mentally retarded, deaf, blind (p. 44).

Use of an etiological framework. Although the PL 91-230 definition does not explicitly state causation of the learning disability, the terms "brain injury" and "minimal brain dysfunction" provide an implicit assumption.

According to Bryan (1974), the adoption of the medical terminology in the field of learning disabilities may be an attempt by specialists to establish a "technology, jargon, institutional support, and fee structure" (p. 305) that differentiates the "field" from such areas as emotional disturbance.

For whatever reason the field has elected such a framework, the result is a close binding of the etiology and behavior of the learning disabled child. General medical terminology such as "minimal brain dysfunction" has been identified as relating to general behavioral terminology such as "language deficiency," "hyperactivity," or "short attention span." These descriptions typically lack specificity and are used in circular, nonproductive logic. For example, the diagnostician uses the term "minimal brain dysfunction" to "explain" the characteristics that prompted the referral. Therefore, minimal brain dysfunction accounts for the characteristics (the source of referral) and, conversely, the characteristics are taken as evidence that minimal brain dysfunction is present. This only certifies that a learning disability is apparent. It does nothing to further the child's educational prospect.

A medical etiology is a disease model which assumes that the "pathology of disease" resides within the individual (Bartel & Guskin, 1971; Mercer, 1973: Sagor, 1972). Special education today heavily relies on such medical orientation, thereby emphasizing etiological disease, diagnosis, and prescriptive treatment. Psychological phenomena, behaviors for example, are viewed as mechanical reactions to underlying pathology. A partial outcome is the generation of categories reflecting diagnosis of suspected etiology.

Often the implicit assumption is that the problem is diffuse and therefore labeled organic in nature (e.g., brain damage). Behavioral manifestations collapse into such successively smaller nonobservable categories as

immaturity. As a result, organic pathology, not behavior, becomes the acceptable descriptor of children. The thrust of intervention is one of organic classifications--special classes for learning disabled children--rather than an alteration of the interaction between the child and his/her environment.

Educators, psychologists, and other non-medical professionals of recent years could be considered largely responsible for the emphasis of physiological factors in learning disabilities. The writings of Cruickshank (1966), Freidus (1964), Frostig (1962, 1963), Goldstein (1942), Kephart (1971), Strauss and Lehtinen (1947), and many others note the necessity of diagnosis in determining etiology to account for observable behavior patterns. Unfortunately, such diagnosis for etiology has remained prerequisite to the introduction of any educational input. Moreover, such diagnosis is often worthless for attaining educational objectives (Black, 1967; Hammill, 1971; Hartledge & Green, 1973; Keough, 1971). How to teach the child or to determine the methodology is not necessarily answered by determining the etiology (Cohen, 1974). In addition, the adequacy of determining etiology, especially brain damage, has not been demonstrated (Reed, Rabe, & Mankinen, 1971). Instruments (e.g., the EEG) and procedures for detecting soft signs, have not been found to be reliable (Freeman, 1971; Hartledge & Green, 1973).

Because of the multiplicity of interpretations of learning disabilities and the lack of valid, reliable measures to identify those children and youth who may possess learning disabilities, any conclusions concerning the nature of the language of "learning disabled" adolescents should be viewed with caution. On such matters, Wepman et al. (1975) state:

> The lack of a clear definition of this category of handicap has not only created problems in the control of special education funds; it has also vitiated much unfocused educational, psychological, and medical research. The inconsistent results obtained in much of this research are a consequence of the great heterogeneity of this population and the fact that research samples drawn from an ill defined population can be expected to differ widely merely by chance (p. 103).

Social-Cultural Environment Factors in Language and Learning Disabilities

The present review does not consider the extensive literature dealing with cultural deprivation and the relationships of social-cultural, environmental factors to language performance and language and learning disabilities. Social-cultural environmental factors and cultural deprivation are rarely considered in current definitions of learning disabilities, although language deficits and/or differences may be concomitants of sociocultural variables. Moreover, a large proportion of children and adolescents who fall within the rubric of "disadvantaged," manifest behaviors (e.g., hyperactivity, perceptual-motor problems) defined as learning disabilities (Herrick, 1973; Mackie, 1968; Myers & Hammill, 1969; Redelheim, 1973). Furthermore it is particularly in language-related areas (e.g., reading and writing) that both retarded and nonretarded disadvantaged children and adolescents are most restricted in their academic learning when compared with more advantaged nonretarded peers. Evidence also suggests that functional mental retardation may be closely related to linguistic "conflicts" between speakers (e.g., teachers, clinicians, examiners) of standard English and auditors whose language is nonstandard English (Adler, 1972; Bryen, 1974; Labov, 1972; Williams, 1970).

The literature is replete with articles by investigators who hypothesized or investigated language deficits and/or differences of culturally disadvantaged

and minority-group status children and adolescents (cf. Anastasiow, 1971; Baratz, 1970, 1973; Bartel & Axelrod, 1973; Bereiter & Engelmann, 1966; Bernstein, 1967, 1970; Cazden, 1966; Deutsch et al., 1967; Dever, 1972; Ervin-Tripp, 1972; Gottesman, 1972; Hess & Shipman, 1965; Jensen, 1968; Labov, 1967, 1970; Levy, 1972; Rohwer, 1971; Vernon & Mitchell, 1974; Williams & Wood, 1970).

Additional empirical research is needed to provide more specific and direct evidence relating sociocultural environmental factors to the child's and adolescent's intellectual and linguistic growth and performance. Social, cultural, and ethnic factors may assist in the description of language habits among groups of children, but they are not necessarily the determinants of language deficit. We know little about the effects of specific sociocultural environmental variables on individual language development and particular language processes. The question arising from much of the research on language problems of disadvantaged children and adolescents is whether differences observed in their language performance (e.g., dialect differences from standard to white middle class English) have been mistaken for, or attributed to such language deficiencies as competence (Sitko & Semmel, 1973). Further discussion and investigation of the language and language-related academic problems of disadvantaged and minority children and adolescents, and of various deficit-difference positions, may be found in the following sources: Allen, 1970; Anastasiow, 1971; Baratz & Baratz, 1970; Baratz & Shuy, 1969; Bartel, Grill, & Bartel, 1973; Bryen, 1974; Carter, 1970; Cazden, 1970; Cole & Bruner, 1971; Dale, 1972; Deutsch, Katz, & Jensen, 1968; Gonzalez, 1974; Hall & Turner, 1974;

Houston, 1970; Horn, 1970; Jensen, 1974; Labov, 1970; Meissner, 1975; Passow, Goldberg, & Tannenbaum, 1967; Ramstad & Potter, 1974; Valletutti, 1971; Williams, 1970.

Language and Learning Disabilities

Language disorders are paramount in the PL 91-230 definition of learning disabilities. Many terms used in the PL 91-230 definition are based in the fields of speech or language (e.g., developmental aphasia). Language disorders have been proffered as symptoms of a learning disability as well as the cause. Investigators interested in language and learning disorders have played a major role in shaping the field of learning disabilities. Although early specialists in the field (Strauss & Lehtinen, 1947; Strauss & Kephart, 1954) concentrated most of their efforts on perception and behavioral characteristics, they alluded to the language disorders of "brain-injured children."

Goldstein (1942), who worked with brain-injured World War I soldiers, significantly influenced Strauss and Werner's investigations with brain injured retarded children. Goldstein wrote of the wounded soldier's loss of the use of abstract language, motor or sensory aphasia and of reading and writing difficulties. In the same vein, Strauss and Kephart (1954) include in their book, Psychopathology and Education of the Brain Injured Child Vol. II, a chapter entitled "Psychopathology of Language." They describe language as a process dependent on perception and outline Piaget's theories of language development (Piaget, 1948).

Strauss and Kephart characterize the language of brain-injured children as animistic or egocentric for longer periods of time than normal children.

In describing this phenomenon they state:

> It is not necessary, however, to assume that the brain injured child is more "animistic" in his thinking than the non-brain injured but only to assume as in fact we know, that his percepts are less well formed, that he is revealing this fact in his language and that he uses this type of language for a longer time than the non-brain injured child (p. 102).

Samuel T. Orton, sometimes called the "father of dyslexia" in the United States, also wrote about the language difficulties of the dyslexic child. Orton (1937) posited that delays and deficits in language function may be due to a deviation of the processes of establishing unilateral brain superiority in individual areas. He cites childrens' developmental language disorders that are physiologically similar to the disturbances in language of adults who have lesions in critical cortices controlling language. He terms these disturbances word deafness (inability to understand the spoken word), developmental motor aphasia, developmental agraphia (writing problems) and developmental alexia (reading problems).

A significant figure in the investigation of language difficulties of learning disabled children is Helmer Myklebust. Initially an investigator of deafness and aphasia, his prime interest in learning disabilities has been the language of the learning disabled. He, as Orton (1937), feels that learning disabilities are "neurogenic" in origin (Johnson & Myklebust, 1967; Myklebust, 1954). In diagnosing and programming for children with learning disabilities, he considers the intraneurosensory and integrative learning disabilities of the child. Myklebust explains the neurological basis of learning as the brain's receiving, categorizing, storing, and integrating of information. Myklebust (1954) classifies language function according to inner language (thinking and verbal imagery), receptive language

hearing and reading), and expressive language (speaking and writing). He and Johnson present disorders in all functions of language and suggest instructional strategies for dealing with each.

Samuel A. Kirk is one of the most well known and respected contributors to the field of learning disabilities and language disorders. Because of his recognition of inter- and intraindividual differences of exceptional children and the need for standardized instruments that can detect these differences, Kirk and his associates developed a standardized language test to provide more instructionally relevant information to the diagnostician and the classroom teacher. This test, the Illinois Test of Psycholinguistic Abilities (ITPA) (Kirk, McCarthy, & Kirk, 1961, 1968) has been extensively field tested and revised. It is now widely used in the diagnosis of learning disabled children.

The theoretical basis for the ITPA stems, in part, from the Osgood Model of the Communication process (Osgood, 1953, 1957). Although Osgood has modified his model in the direction of transformational theory (Osgood, 1968), he originally extended mediational S-R theory to linguistic behavior. (For a detailed description of the development and standardization of the revised version of the test, see Paraskevopoulos & Kirk, 1969; Kirk & Kirk, 1971.) Since the introduction of the ITPA, many investigations of various aspects of the test have been conducted. A discussion of these studies appears in the sections of assessment and intervention in this paper.

Joseph M. Wepman, whose research and clinical experience originated with adult aphasics, has influenced the field of learning disabilities in the areas of theoretical constructs of language, assessment, and programming. Wepman et al. (1960) presents three levels of language functions: the

reflexive, the perceptual, and the conceptual. Processes of language function are transmission and integration. Transmission is divided into encoding and decoding modes. The theoretical construct "memory back" is an important component to perceptual and conceptual language. Feedback, both external and internal, is included in the language model. The processes of encoding and decoding in this view are modality bound and integration of these processes is important for language comprehension.

In the area of assessment, Wepman (1958) devised a test of auditory discrimination designed to measure differences between phonemes. This widely used test measures speech sound discriminations among children between the ages of five and eight. Another test, the Language Modalities Test for Aphasia, (Wepman & Jones, 1961) was developed to assess modalities.

Wepman's contribution to programming is his emphasis of teaching toward the strong modality of the child. Major differences that occur in the perceptual level of learning affect the child's learning in reading and other skill areas. He suggests teaching through a child's single strong modality rather than combined modalities. Weaker modalities should be trained separately.

In summary, these clinicians and investigators of language have influenced both the fields of language pathology and learning disabilities, especially in the development of assessment and instructional techniques for learning disabled children and adolescents. Unfortunately, models of language processing presented by these theorists generally do not adequately reflect current language research in the fields of linguistics, psycholinguistics, and cognitive psychology.

Assessment of Language Disabilities

Accurate and valid assessment is crucial in developing instructional strategies for the adolescent learning disabled in the area of language. It is our belief that precise assessment in terms of developmental levels of language is a prerequisite to the development of language intervention strategies.

Language assessment for the learning disabled and mildly retarded is still rather primitive. In an intensive review of the language literature dealing with retarded children, Sitko and Semmel (1973) found a lack of effective assessment of language competence and performance of retarded and disadvantaged children. Rosenberg (1970) emphasizes the need for language assessment devices with normal and handicapped children that are based on recent, valid, theoretical, methodological, and research developments in the language sciences. He feels developers of language tests do not consider everything currently known about language and language development.

For example, Rosenberg severely criticizes the ITPA for not incorporating recent work in developmental psycholinguistics. Moreover, evaluations of the ITPA indicate severe weaknesses in its rationale, validity, and reliability (Cazden, 1971; Dever, 1971; Hammill & Larsen, 1974; Mehrabian, 1970; Sedlack & Weener, 1973; Severson & Guest, 1970; Van Hattum, 1969; Weener, Barritt, & Semmel, 1967; Ysseldyke & Salvia, 1974). McCarthy (1975) criticizes the use of the ITPA--normed on children ages three through ten--as an inappropriate assessment tool and research measure of language difficulties with adolescents.

Irwin, Moore, and Ramps (1972) note that current evaluation of language disorders is incomplete. Specifically, a direct measure of deep structure

(in transformational terms) is beyond our clinical ability, and certain language measures are more precise than others. Dever (1971) argues that current methods of testing language development in children and adolescents do little to provide a methodology for the clinician, special class, or resource teacher.

Moreover, evaluation of language difficulties of the adolescent is further complicated since adequate assessment of language development (Lee, 1974) stops too early in the sequence of development to be of much use in the classroom, particularly in the secondary grades (Dever, in preparation). Few language assessment instruments are available for measuring and classifying the dramatic changes that occur in children after age five in the areas of syntax, semantics, and phonological skills. Unfortunately most of the more promising linguistic measures have been developed for assessment of language in young children (Sitko & Semmel, 1973). Some promising language sampling and assessment techniques developed for analyzing a child's language behavior may be found in the following sources: Baratz, 1969; Cazden, 1971; Foster, Giddan, and Stark, 1972; Lee, 1974; Lee and Canter, 1971; Marge, 1972; Severson and Guest, 1970; Tyack, 1973; and Gottsleben, Bushini, and Tyack, 1974.

Many other tests based on the assessment of language disorders in the learning disabled have been developed. (See Berry, 1969; Cawley et al., 1972; Gillespie & Johnson, 1974; Hammill & Bartel, 1975; Irwin et al., 1972; Mauser & Denbinski, 1974; Myers & Hammill, 1969, for an overview and critique of tests currently used.) Like the ITPA, these, too, have been criticized. For instance, Irwin et al. (1972) criticizes the Peabody Picture Vocabulary

Test (PPVT) for its use with populations other than those included in the standardization sample. Moreover, the use of the PPVT as a single diagnostic measure of language by clinicians is extending the scope of the instrument which attempts to measure only the child's receptive vocabulary (Van Hattum, 1969).

Language measures used for diagnosis and subsequent placement and treatment for both learning disabled children and adolescents have been found deficient in certain psychometric aspects. These include reliability, validity, and utility. Specifically, reliable, valid, and educationally relevant measures of adolescents' language competencies do not exist. There now exists only a limited range of language instruments, many based on inadequately researched theories of language abilities. From a socio-cultural point of view various standardized language assessment instruments are considered to be linguistically and culturally biased and do not reflect the linguistic structure of non-standard English. Adequate language sampling assessment devices appropriate for adolescents should differentiate between underlying phonological, syntactic, and semantic competence and observable linguistic performance. In addition, they should take into account dialect and cultural idiosyncracies.

If we wish to develop effective remedial and/or developmental language training programs, we must first be able to assess accurately the nature of the child or adolescent's language problem. Unfortunately in learning disabilities, we have become too normative and product-oriented rather than criterion- and process-oriented in our approach to language assessment of children and adolescents.

Language Characteristics of Adolescent Learning Disabled

Several critical issues concerning the literature of the language

and speech characteristics of the learning disabled adolescent need mentioning:

(1) A precise operational definition of learning disabilities has not been established.

(2) Criteria for selecting children for descriptive studies dealing with language vary greatly. (See Adelman, 1971; Bortner & Virch, 1969; O'Grady, 1974; Orlando, 1973; Wepman et al., 1975.)

(3) Investigators differ widely in orientation and definitions of language and language behaviors.

(4) Many language characteristics ascribed to learning disabled children are based on clinical observations rather than empirical evidence.

(5) Only minimal research exists concerning speech and language characteristics of the adolescent learning disabled.

(6) The many gaps and methodological weaknesses make generalization from the studies on children to the adolescent extremely difficult.

Because of the lack of investigation dealing with the adolescents, we will briefly review the nature of the studies reported on children and youth categorized as learning disabled. The following categorizes this research into speech characteristics, general language, and information processing studies. Research relating to reading problems and reading as a language processing activity has been presented elsewhere (Gillespie & Sitko, 1975).

1. Speech Disorders and Learning Disabilities

Speech difficulties have been included among the characteristics of the "learning disabled," "dyslexia," and "minimally brain damaged," (Bakwin, 1965; Bannatyne, 1971; Clements, 1966; Hallgren, 1950; Ingram,

1960; Jansky, 1969; Johnson, 1973: Johnson & Myklebust, 1967; Lenneberg, 1967; Myers & Hammill, 1969; Orton, 1937; Rabinovitch, 1962; Wiig, Semel, & Crouse, 1973; Wyatt, 1969).

Immature speech patterns, mild speech irregularities, problems of articulation, and general intelligibility cluttering--a rapid, jerky, stumbling speech with marked omissions and substitutions to a degree approaching jargonic speech (Harris, 1970)--have been attributed to some children and adolescents labeled learning disabled. Johnson (1973) describes some children with psychoneurological learning disorders as having difficulties with the motor patterns for speaking. This is characterized as dyspraxia--poor lip and tongue motility--although no evidence of paralysis or structural problems exists. According to Johnson and Myklebust (1967), the apraxic has the adequate lip and tongue movements but does not "know how or where to place his tongue" (p. 24). They also describe apraxic speech disorders among adolescents and necessary intervention strategies for correcting the difficulties. Myers and Hammill (1969) note from clinical experiences that many of these children "show evidence of poor lip and tongue motility and coordination" (p. 46).

De Hirsch (1963) describes learning disabled adolescents who exhibit speech irregularities, cluttering, and minor articulation inaccuracies as part of their total language disability. Jansky (1969) writes of a severe dyslexic adolescent who had been referred for speech evaluation at the age of six and who still possessed poor motor speech patterns. Members of the boy's family exhibited hesitations, disorganizations, blocking and stuttering into their adolescent and adult life. Both de Hirsch (1963) and Jansky

(1969) describe such adolescents as "plastic"--those with an inability to stabilize various types of configurations (Bender, 1953).

Most of the speech difficulties observed in learning disabled adolescents are clinical and descriptive. Although mild speech irregularities are described by a few investigators, the incidence and nature of speech problems have been virtually neglected.

2. General Language Difficulties

As stated, there are many definitions and interpretations of the language process. Studies dealing with the language of learning disabled populations reflect a wide variety of interpretations and assessments of language. The following categories reflect the language research found in the literature: oral language, including reception, integration, and production; written expression; and information processing.

A. Oral Language. Numerous investigators, theorists, and clinicians address the difficulties in the receptive, integrative, and expressive aspects of oral language of learning disabled children and adolescents. (See Johnson & Myklebust, 1967; Marge, 1972; McCarthy & McCarthy, 1969; Myers & Hammill, 1969; O'Grady, 1974; Rosenthal, 1970; Semel & Wiig, 1975a & 1975b; Vogel, 1974; Wiig & Semel, 1975; Wiig, Semel, & Crouse, 1973.)

According to Vogel (1974), the literature of oral syntax of "dyslexic" children attributes deficiencies or immaturities in oral syntax to learning disabled children. (Doehring, 1968; Ingram, 1960a; Johnson & Myklebust, 1965; Rabinovitch, 1959.) Vogel found that seven and eight year-old dyslexic boys were deficient on 7 of 9 indicators of syntax and morphology:

recognition of melody pattern, sentence recognition, morphology of nonsense words, morphology of real words, grammatic closure, oral closure procedures, and syntax complexity. There were no significant differences on "recognition of grammaticality" and the "Northwestern Syntax Screening Test." Seven of the nine measures utilized in the study were experimental rather than standardized. Vogel concludes that the findings may help identify high risk children before they enter school.

Similar findings are noted by Wiig et al. (1973) and Wiig and Semel (1975). Wiig and Semel (1972, 1973, 1974, 1975) and Wiig et al. (1973) conclude from comprehensive studies and detailed reviews that learning disabled--as compared with normal children--possess deficiencies in receptive vocabulary, delays in the acquisition of rules of morphology, name and word finding difficulties, reductions in verbal fluency, quantifiable reductions in the ability to use morphological rules, and difficulties in the comprehension of linguistic concepts requiring logical operations.

Semel and Wiig (1975a) summarize findings from a series of studies investigating the following auditory language processing abilities of learning disabled children and adolescents: (1) comprehension or critical word sequences and syntactic structures, (2) knowledge and comprehension of English morphology, (3) comprehension of linguistic concepts requiring logical operations, and (4) immediate recall of semantically and syntactically varied sentences. (Goodglass & Kaplan, 1972; Kolers, 1972; Mecham et al., 1966; Menyuk & Looney, 1972; Piaget & Inhelder, 1969; Semel & Wiig, 1975b; Wiig & Roach, 1974; Wiig, Semel, & Crouse, 1973.)

The combined results from these studies show:

(1) Learning disabled children exhibit quantitative reductions in the

acquisition and comprehension of syntax (Semel & Wiig, 1975b; Menyuk & Looney, 1972). This supports related research indicating that a large proportion of learning disabled children exhibit significant reductions in receptive and expressive syntactic abilities (McGrady & Olson, 1970; Rosenthal, 1970; Wiig et al., 1973; Wiig & Semel, 1974). Moreover, learning disabled children in the Semel and Wiig (1975b) study exhibited quantitative reductions in the ability to process and synthesize critical verbal elements. Delays in the acquisition of syntactic rules were not significantly reduced with age (i.e., between 7 and 11 years). Error patterns were most discriminating on sentences of higher grammatical complexity: question sentences, sentences with demonstratives and "wh" forms, possessive relationships, and relationships with direct and indirect objects.

(2) Learning disabled children exhibit quantitative delays in the acquisition of morphology when compared with achieving age peers (Wiig, Semel, & Crouse, 1973). In particular, learning disabled children reveal the greatest relative differences for third person singular, possessives, and adjectival inflections.

(3) Learning disabled children exhibit significant deficits in the comprehension of linguistic concepts in which logical relationships are expressed between two or more verbal elements. In particular, they demonstrate most errors in comprehending familial relationships, followed in decreasing order of difficulty by spatial relationships, temporal relationships between sequential events, passive relationships, and comparative relationships (Wiig & Semel, 1973). Moreover, comprehension of familial relationships by learning disabled children tends to be at "sensorimotor" or "preoperational" levels (Inhelder & Piaget, 1964; Piaget & Inhelder, 1969).

(4) Comprehension deficits for linguistic concepts expressing comparative, passive, spatial, temporal, and familial relationships persists in learning disabled adolescents (Wiig & Semel, 1974).

(5) Both learning disabled children and adolescents reflect impairments of abstraction, generalization, simultaneous analysis, and synthesis and delays in logical growth (Semel & Wiig, 1975b; Inhelder & Piaget, 1964; Luria, 1966; Mecham et al., 1966; Piaget & Inhelder, 1969).

(6) Sentence length and structure are significant variables in sentence recall by learning disabled children (Menyuk & Looney, 1972).

(7) Significant variables in sentence recall by learning disabled adolescents are semantic consistency and syntactic complexity (Wiig & Roach, 1974).

According to Semel and Wiig (1975a) the data on sentence recall suggest short term memory limitations in learning disabled adolescents. The data further imply that deep structure and semantic interpretations (represented in long term memory) facilitate auditory processing and recall. The authors conclude that several research areas of auditory language process deficits associated with learning disabilities need further investigation, particularly those areas related to comprehension of prepositions and prepositional phrases, negations, adjectives, and modifier-strings.

In the area of language production deficits in learning disabled adolescents, Wiig and Semel (1975) report a scarcity of investigations about the nature and extent of productive language deficits associated with learning disabilities. On the other hand, learning disabled children have been found to exhibit oral language problems, characterized by deficits in oral syntax, name and word finding difficulties, and reductions in "verbal fluency" (Bannatyne, 1971; Johnson & Myklebust, 1967; Kass, 1962; Lerner, 1971; Orton, 1937; Rabinovitch, 1959; Vogel, 1974).

In their study of language production of 32 adolescent learning disabled, ages 12-16 years, Wiig and Semel (1975) administered an experimental test battery containing the following subtests: (1) verbal opposites (Detroit Test of Learning Aptitutes), (2) visual confrontation naming (Boston VA Test), (3) an adaptation of the fluency of controlled association subtest (Boston VA Test), (4) producing sentences (Minnesota Test for Differential Diagnosis of Aphasia). In addition, conversational speech characteristics were rated on the Rating Scale Profile of the Boston VA Test (Goodglass & Kaplan, 1972). Comparisons of the performances on the subtests indicated that the academically achieving adolescents performed significantly better than the learning disabled adolescents on all but two subtests--sentence production and fluency of controlled association.

A comparison of ratings of the speech characteristics showed that the learning disabled adolescents scored close to normal on characteristics other than phrase length and grammatical form.

(A) On the verbal opposites subtest, requiring accurate naming of antonyms in response to stimulus words, learning disabled adolescents showed a significant reduction in the ability to retrieve accurate verbal opposites and a reduced verbal retrieval speed for opposites.

(B) On the confrontation naming subtest requiring retrieval of verbal labels in response to pictorial presentations of objects, letters, geometric forms, actions, numbers, and colors, learning disabled adolescents exhibit significant reductions in the accuracy and speed with which they labeled the pictorial presentations. Wiig and Semel (1975) further report similar deficits in the accuracy and speed with which younger dyslexic children name pictured objects (Denckla, 1974).

(C) The controlled association subtests required retrieval and naming of category class members. Differences between the two groups evidently result from reduced semantic categorization by the learning disabled adolescents. The findings appeared not to contradict previous reports that learning disabled children develop linguistic categorization rules at expected ages (Bartel et al., 1973).

(D) On the Sentence Production test, requiring a grammatical sentence to be formulated using various stimulus words, the learning disabled adolescents exhibited reduction in speed and accuracy in sentence formulation. In addition the learning disabled adolescents were poorer at defining words. Their responses lacked abstract, general aspects of the concepts.

The Wiig and Semel (1975) findings suggest "a relationship between productive language deficits in learning disabilities and (1) delays in the development of specific aspects of cognition and convergent and divergent production of semantic units and (2) reductions in the retrieval of verbal labels and syntactic structures. (Goldstein, 1948; Goodglass & Kaplan, 1972; Guilford, 1967; Luria, 1966, 1973; Schuell, 1965)" (p. 7).

Moreover, the authors report their findings support previous observations of oral language problems in children with learning disabilities. Further, productive language deficits associated with learning disabilities may "persist" into adolescence and may relate to previously observed difficulties in language processing associated with learning disabilities (Vogel, 1974; Wiig & Semel, 1973, 1974). The authors indicate a need for both early screening and identification of productive language deficits and emphasis on language production abilities in the educational management of the learning disabled child and adolescent.

Written Expression

Marked impairment in spelling and all forms of written expression are consistently found by those working with children and adolescents categorized as dyslexic, neurologically impaired, brain-injured, and specific learning disabled (Boder, 1971; de Hirsch, 1963; Lerner, 1971; Myers & Hammill, 1969; Myklebust, 1973; McLeod, 1975; Orton, 1937; Saunders, 1962).

According to Myklebust (1965, 1973), the learning of written language is a developmental process that continues through adolescence. Johnson and Myklebust (1967) describe writing as a form of expressive language and a complex process involving the highest forms of language. They attribute difficulties of written language to such deficits in auditory comprehension as auditory discrimination problems, oral syntax disorders, reauditorizations deficits, reading difficulties, and disturbances in visual motor integration. Myklebust (1965) uses his Picture Story Language Test to devise a means of studying the characteristics of the written language of the learning disabled.

Myklebust (1973) used the test to study the characteristics of the written language of children and adolescents whom he categorized as dyslexic and learning disabled. The dyslexic population consisted of 66 seven to eighteen year-old children. On EEG and neurological evaluations, 83.8% had positive findings. A normal control was also chosen from the urban public schools. The dyslexics experienced major difficulty in written expression on the categories of story length and syntax. Normal children achieved adult level syntax at age 11; the dyslexics, not until age 15. Myklebust also found positive correlations between auditory processes and written language.

Other investigators (Boder, 1971; de Hirsch, 1963) describe writing problems of the learning disabled. According to Boder, certain spelling

patterns can be used to identify dyslexia. She uses the term "dysgraphia" to describe severe spelling and handwriting problems of dyslexics. This term has been used by others (Johnson & Myklebust, 1965; de Hirsch, 1963; Hermann, 1959). de Hirsch (1963) describes some dyslexic adolescents as exhibiting bizarre spelling patterns due to inability to retain the internal design of printed words and to carry the "Gestalt" of a word into another setting. Poor visual and auditory memory and poor discrimination are given as causes of spelling difficulties in adolescents.

Since the introduction of the phenomena strephosymbolia--twisted symbols--by Orton (1937), the literature has been replete with the description of learning disabled children and adolescents' reversals and rotations in written expression. Most often, severe spelling problems are cited as symptoms of other language and perceptual difficulties, i.e., auditory receptive problems, visual-motor integration difficulties, sound blending ability, auditory-visual integration and memory. Except for perhaps Myklebust's study of 1973, little systematic analysis of problems and processes involved in written expression has been conducted with the adolescent learning disabled.

3. Information Processing and Language Behavior

One promising approach to investigating language problems of learning disabled adolescents is based on work in psycholinguistics and cognitive psychology, particularly information theory. Researchers in these fields are concerned specifically with issues relating to selecting, storing, processing, and retrieving relevant information in a learner's environment. They frequently stress (1) the limited capacity of the human information-processing system and (2) the importance of subjective organization and efficient high level cognitive and linguistic processes or strategies for recoding stimulus input in maximizing the amount of relevant information

that can be received, processed, and remembered (Ausubel, 1968; Broadbent, 1958; Bruner, Goodnow, & Austin, 1956; Bruner, Oliver, & Greenfield, 1966; Hagen, 1972; Hunt, 1966; Mandler, 1967; McNeill, 1970; Miller, 1956; Miller, Gallanter, & Pribram, 1960; Neisser, 1967; Newell & Simon, 1972; Olson, 1970; Piaget, 1951, 1955, 1966, 1970; Slobin, 1971; Taba, 1966; Tulving, 1962; Tulving & Donaldson, 1972; Vygotsky, 1962; White, 1965).

In fact, school learning and social adaptation in general greatly depend on the ability to accurately decode, interpret, and encode stimulus input by the learner. Hence, in academic learning situations the child is viewed as an active learner who possesses a repertory of organizational processes from which s/he must select those appropriate to the particular learning situation and exclude irrelevant or task-incidental information.

In a comprehensive review of the literature concerning the language and language behavior of the mentally retarded, Sitko and Semmel (1973) note that during the last decade, many literature reviews on linguistic problems of the mentally retarded reflected minimal influences of the important developments in the fields of psycholinguistics and information theory. For example, little attention has focused on cognitive or organization strategies used by retarded children in processing language. Moreover, researchers have devoted little time to the grammatical or generative aspects of the language system of retarded children.

In our view, these same conclusions pertain to research on the learning disabled child or adolescent. The little literature that exists reflects only minimally the influences of important developments in the fields of linguistics, psycholinguistics, and information theory as indicated above.

Research related to the language of learning disabled children and adolescents has focused mainly on the performance aspect of lan uage behavior, i.e., descriptive aspects of the child's or adolescent's speech and the psychological variables which affect such behavior. Considering the importance of efficient information processing in human learning and memory, it is possible that memory and other deficits--including reading deficits attributed to learning disabled children and adolescents--may be due in part to faulty or inefficient processing and organization of linguistic stimuli.

Indeed this position is supported in the area of mental retardation by several investigators who have studied the learning characteristics of moderately and mildly retarded children and adolescents (cf. Blanton, 1974; Butterfield & Belmont, 1972; Cawley, Goodstein, & Burrow, 1972; Ellis, 1970; Gerjuoy & Spitz, 1966; Gruen & Korte, 1973; Jensen, 1970; Martin, 1967; Milgram, 1971; Prehm, 1968; Riegel & Taylor, 1974; Semmel, 1967; Sitko & Semmel, 1973; Spitz, 1966, 1973). These studies provide strong evidence that retarded subjects tend to use low level and inefficient organizational or recoding strategies in processing a wide range of linguistics material in learning tasks.

Despite these findings there is additional evidence that EMR children and adolescents do possess the competence necessary for recoding certain types of linguistic information when environmental cues which facilitate the use of higher order organizational abilities are provided. Several studies show that EMR children and adolescents can be trained or cued to use specific linguistic strategies to facilitate the acquisition and retention of linguistic material (Agard, 1971; Blanton, 1974; Gerjuoy & Alvarez, 1969; Martin, 1967; Riegel et al., 1973; Rohwer, 1967; Ross, Ross, & Downing, 1973; Sitko & Semmel, 1972; Turnbull, 1974; Vitello, 1973; Whitely & Taylor, 1973).

Findings from these studies suggest that educators may be able to improve storage and/or retrieval of information of retarded children and make information more "accessible" to their memory. This could be done by developing specific pedagogical cues and training procedures and by structuring and presenting learning materials in a well-organized manner. It is important to determine if similar training with learning disabled subjects will result in the use of cognitive and/or linguistic processing strategies that prove more efficient than those which currently characterize this population of school-age children and adolescents.

From a psycholinguistic point of view, we need to determine if the linguistic problems associated with learning disabilities are due to performance variables (e.g., short-term memory deficits, attentional deficits, social-cultural-situational factors, motivation, and so on) or to competence variables (i.e., lack of knowledge of specific grammatical, phonological and/or semantic relationships or rules), or perhaps to the interaction of both competence and performance variables.

Most definitions of learning disabilities make some reference to difficulties related to information proessing and information. Unfortunately, the relationship between information processing and language and speech difficulties in the learning disabled has not been clearly established. Measures used to assess information processing are still in a primitive state. For instance, in the area of reading, Orlando (1973) states:

> The measures used to assess "information-processing deficits" are the same measures that have been used for years by school psychologists to identify general visual and auditory problems, without regard to specific reading skill behaviors of the child (p. 268).

Generally, information processing skills of learning disabled children and adolescents have been assessed by such standardized instruments of auditory and visual-motor perception as The Wepman Test of Auditory Discrimination (Wepman, 1958), the ITPA, the Visual Motor Gestalt Test (Bender, 1938), or the Developmental Test of Visual Perception (Frostig & Horne, 1964). Recently the usefulness of these tests and their related programs in determining, assessing, and enhancing critical processing skills in language and reading has been seriously questioned (Camp, 1973; Cohen, 1969; Hammill & Larsen, 1974a,b; Hammill & Wiederholt, 1973; Mann, 1973; Orlando, 1973; Samuels, 1973; Sedlack & Weener, 1973; Ysseldyke, 1973). These authors provide excellent reviews of the mass of literature related to decoding, integration, and encoding of auditory and visual stimuli with learning disabled subjects. More specific studies and/or reviews dealing with information processing of a wide variety of information in learning disabled subjects may be found in the following sources: Birch and Belmont, (1964); Bryan, (1974); Chalfant and Scheffelin, (1969); Faust, (1970); Haring and Ridgway, (1967); Johnson and Myklebust, (1967); Kagen and Kogan, (1970: Keough, (1973); Keough and Donlon, (1972); McGrady and Olson, (1970); Sabatino, 1968, 1973); Sabatino and Hayden, (1970).

Unfortunately past studies of information processing of learning disabled subjects have yielded diverse and conflicting findings. As a result, our understanding of the basic processes underlying language problems of learning disabled children and adolescents is extremely limited as is our confidence in prescribing efficient language remediation and training programs.

In our view there is a scarcity of investigations exploring the nature and extent of language processing strategies and language deficits in learning

disabled children and,particularly,adolescents. For instance, there is some indication that an individual's ability to process and organize linguistic information may be strongly related to the nature of the reading process. Despite the importance of efficient information processing in learning and memory,there has been relatively little attention among researchers to the language and cognitive strategies observed among learning disabled children and adolescents in various academic learning situations. Chalfant and Scheffelin (1969) note the need for comprehensive research on both receptive and expressive language disorders or difficulties related to central processing dysfunctions. Moreover, Keough and Donlon (1972) conclude that assessment of how a child approaches and attempts to solve a learning task, the kind of information s/he uses, how s/he organizes it, and the speed with which s/he uses it may provide critical information for development of remedial programs (p. 336). However, only recently have researchers in learning disabilities begun to focus on language processing strategies of learning disabled children and adolescents (e.g., Bartel, Grill, & Bartel, 1973; Semel & Wiig, 1975, a, b; Vogel, 1974; Wiig & Semel, 1973, 1974, 1975).

In their excellent investigation of language production deficits in learning disabled adolescents, Wiig and Semel (1975) conclude that the productive language deficits observed in their population of learning disabled adolescents may be related to previously observed difficulties in language processing associated with learning disabilities (Vogel, 1974; Wiig & Semel, 1973, 1974). They suggest that observed deficits in the accuracy and speed of convergent and divergent production of semantic units, confrontation naming, and sentence formulation may reflect such receptive language problems in learning disabilities as reduced comprehension of linguistic structures and linguistic concepts

requiring logical operations. Semel and Wiig (1975a) conclude that future investigations in learning disabilities should consider "the relationships between visual perception, linguistic and cognitive processing, and 'channel capacity' and 'clunking' characteristics of learning disabled youngsters" (p. 8).

Freston and Drew (1974) investigated the verbal performance of learning disabled children as a function of input organization. They explored the effects of organized versus unorganized material on the free recall performance of learning disabled children (CA 7-17 years). The sample was randomly subdivided into two groups receiving either organized or unorganized verbal material. Materials consisted of 12 tests of five stimulus words each. Organized lists were composed of four conceptual categories from stimuli of high, intermediate, and low difficulty as selected according to frequency of occurrence in English language usage. This resulted in a low, intermediate, and high difficulty list for each conceptual category. The 12 unorganized lists were formed from identical stimulus items of high, intermediate, and low difficulty, with the conceptual categories randomized.

Subjects were orally presented the words in each list at a rate of one per second. They were given a 30-second free recall period following each of the 12 lists. Results indicated the degree of material organization did not significantly influence subject performance. Subjects did, however, perform differently as a function of material difficulty. Subjects responded correctly with greater frequency on material of low difficulty than on material of intermediate and high difficulty.

The data failed to support previous work with subjects of normal intelligence (Drew & Altman, 1970) and with adolescent EMR subjects (Gerjuoy & Spitz, 1966; Gerjuoy & Alvarez, 1969) which shows a facilitative influence of organized

material. The authors hypothesize that the absence of more effective recall of organized rather than unorganized material may be because the learning disabled subjects were not sensitive to the conceptual framework used to organize the material and did not codify the material efficiently. The authors feel that factors such as attending, codification, storage, and recall should be studied in depth in subsequent investigations.

Bartel, Grill, and Bartel (1973) note the dearth of literature on precisely how children with learning disabilities handle specific language-related tasks. These investigators used a free word association technique to determine the syntactic-paradigmatic shift in learning disabled and normal children. In normal children, a shift from the use of syntactic or sequential responses (e.g., when presented with red, the child responds ball) to paradigmatic (same form-class; e.g., red-blue) occurs developmentally.

According to McNeill (1970), the paradigmatic shift results from a semantic-consolidation process between the ages of six and eight years when the child sequentially acquires a number of discriminatory features of words and adds new words to his/her lexicon. McNeill further hypothesizes that syntagmatic or syntactic associations reflect a different and less efficient principle of organization of the child's lexicon than do paradigmatic associations. There is some evidence that EMR children reveal significantly fewer paradigmatic responses on a free-word-association task than do nonretarded children of the same age, and that MA rather than CA is a better predictor of word associations of retarded children (Semmel, Barritt, Bennett, & Perfetti, 1968; Sitko, 1970). This finding has been interpreted as revealing a lag among EMR children, characterized by a weakness in organizing linguistic units in hierarchical classes

(Semmel et al., 1968). Although EMR children tend to emit sequential-associative (syntagmatic) responses on word-association tasks, previous results show significant individual differences in word-association responses within EMR samples (Semmel, Varritt, Bennett, & Perfetti, 1968; Semmel, Sitko, & Semmel, 1968).

Yet,the Bartel, Grill, and Bartel (1973) study notes no significant differences between the number of paradigmatic responses emitted by normal and learning disabled children on a word association task of 50 stimulus words. All children performed best when the stimulus word was a noun and performed most poorly on prepositions. Moreover, older children in each group--including some adolescents--performed better than younger children. A significant interaction between IQ and age was found among learning disabled children. Younger subjects of lower IQ (<85) performed most poorly and exhibited the most perseverations.

The authors conclude that learning disabled children develop linguistic categorization strategies at approximately the same ages as normal children. They hypothesize that memory and attention are factors that may affect linguistic performance of learning disabled children in the usual language context of speaking, listening, or writing. Hence, while learning disabled children resemble normal children in linguistic competence and the acquisition of linguistic strategies for categorizing words, it is possible that they resemble EMR children in linguistic performance because of memory and attentional deficits.

Several other investigators have stressed the important and close relationship between memory and attentional processes and language proficiency

and deficit (e.g., Birch, 1964; Graham, 1968; Hallahan & Cruickshank, 1973; Johnson & Myklebust, 1967; Samuels, 1973; Senf & Freundl, 1971; Strauss & Lehtinen, 1941). In her review of auditory and visual processing and cross-modal integration of learning disabled children, Bryan (1974) concludes that "there is no systematically gathered evidence demonstrating that learning disabled children have simple perceptual problems, hyperactivity, difficulty with simple cross-modal integration, minimal brain damage or normal intelligence" (p. 307). Rather than possessing auditory and visual processing difficulties per se, learning disabled children have difficulties in "paying attention, using language, and coping with complex auditory and visual presentations" (p. 308).

Tarver and Hallahan (1974) reviewed the findings of 21 experimental studies of attention deficits in children with a variety of learning disabilities. Children in these studies ranged from kindergarten age to 16 years-three months. Based on the accumulated evidence, the authors conclude: (1) Children with learning disabilities, including "underachievers" and children with reading disabilities, exhibit more distractibility than controls on figure-ground perception tasks involving embedded contexts and on tests of incidental vs. central learning. On the other hand they are not differentially distracted by other types of distractors including flashing lights or extraneous color cues. (2) Hyperactivity of learning disabled children may be situational-specific, with high levels of activity exhibited in more structured situations. (3) Children with learning disabilities tend to be more impulsive (less reflective) as a group than normal controls. Correlational evidence suggests that measures of impulsivity-reflectivity and central learning and incidental learning are related. "Impulsivity and inability to ignore irrelevant information

indicate deficiencies in control of attention" (p. 566). (4) Children with learning disabilities, particularly hyperactive children, are deficient in the ability to maintain attention for prolonged periods of time. Tarver and Hallahan further indicate that WISC subtest patterns may be of some value in differential diagnosis of attentional processes in learning disabilities. Nevertheless, they note that although a WISC subpattern may be characteristic of groups of disabled readers, it is not characteristic of individuals. Moreover, they indicate that particular subtests of standardized instruments like the WISC do not lend themselves to disclosing discrete and specific aspects of the child's psychological functioning.

Samuels (1973) found several shortcomings of the research on causes of reading difficulty. These have resulted in invalid research results and conclusions. Much of the research has been on variables with little, or no direct connection with basic processes involved in learning. Samuels particularly criticizes "comparing good and poor readers on variables which had no direct connection with the learning process, using matched-group designs, unreliability of prediction formulas, reading-achievement and IQ tests, piecemeal research, and using students with a history of reading failure" (p. 229).

Samuels emphasizes that to overcome the problem of piecemeal research, the basic processes involved in verbal learning should be investigated in a systematic and comprehensive manner. He says the research literature provides evidence for several basic processes in associational learning which are also involved in learning to read. These processes include: attentional processes; distinctive-feature learning; visual and auditory memory; auditory discrimination; and mediational processes.

Specifically, Samuels' review indicates: (1) physiological correlates (e.g., GSR, heart rate) are related to learning, (2) low achieving students, including poor readers, tend also to be more distractible than high achieving students, (3) at the upper elementary level, a positive relationship exists between attention and achievement (p. 213). There is also evidence that whole-word methods of teaching reading in combination with highly discriminable words and the use of such incidental cues as color-coding words lead to rapid initial learning, but poor transfer.

Samuels indicates that questions concerning where the learner focuses attention, what cues s/he selects, and whether focal attention is directed at a relevant dimension of the stimulus complex have important implications for reading. He further reports that research on visual memory and reading associates poor reading performance with inferior visual memory. Moreover, the superior visual memory of good readers appears due to their ability to identify distinctive features and to encode them verbally with relatively greater accuracy and consistency.

Samuels presents an information-processing model of associational learning as a method for studying variables or factors associated with differences in reading achievement (and hence, learning disabilities). This model is based on conceptualizations from cognitive psychology and contains components considered basic to the verbal-learning process, i.e., attention, visual and auditory discrimination, auditory and visual memory, short and long term memory, and mediation. In addition, a viable research design is provided for investigating and relating the various components of the model.

A particularly important application of an information-processing approach to language functioning relates to teaching reading and constructing reading

materials for learning disabled children and adolescents. In fact, there is evidence that the ability to process and organize linguistic information may be strongly related to the nature of the reading process and to reading difficulties of poor readers (Bower, 1970; Goodman, 1965, 1968, 1969, 1972; Kolers, 1969; Lefevre, 1964; Neisser, 1967; Ryan & Semmel, 1969; Sitko & Semmel, 1973; Smith, 1971). Despite the importance of active and efficient information processing in learning and memory, reading researchers in learning disabilities have paid little attention to the possible relationship between information processing in learning and memory and reading behavior. Much of the reading instruction and research with learning disabled children and adolescents has been based not on language structure and language processing, but on graphic features and perceptual features of language.

In summarizing the various models for reading based on the active participation of the reader, Ryan and Semmel (1969) emphasize the importance of efficient and hierarchical language-processing strategies in both beginning and mature reading. They conclude that reading can be viewed as a "constructive active process in which the reader uses his cognitive and linguistic knowledge to reproduce a probable utterance from a careful sampling of cues. S/He then matches that prediction for appropriateness" (p. 81).

Ryan and Semmel present considerable evidence suggesting that reading is a cue sampling process rather than one requiring absolute discrimination of detail. The authors further emphasize that children's reading material should be written both to maximize the child's opportunity to develop efficient habits of forming and testing hypotheses and to allow the child to use linguistic context (semantic and syntactic relationships) to determine word perception and comprehension.

Moreover, the beginning retarded or disabled reader should be encouraged by the teacher to apply appropriate high-order language strategies. Such strategies are already available from oral language usage. Emphases should be on "conceptual" rather than "perceptual" aspects of reading and on relations rather than single words.

It seems probable that some of the difficulty experienced by learning disabled children and adolescents in reading comprehension and other areas of reading may be due to a basic weakness in their ability to efficiently and hierarchically process and organize reading materials. In fact, evidence with the mildly retarded indicates the difficulty of retarded children in reading comprehension may result from a basic inability to organize verbal input efficiently for storage and retrieval during the act of reading (Bilsky & Evans, 1970; Blanton, 1974; Evans, 1970).

A review of the literature suggests that many language strategies exhibited by learning disabled subjects are deficient and reflect primitive and inefficient levels of cognitive and linguistic information processing. It seems logical to suggest that language training techniques involving learning disabled subjects should include the modification of inefficient language strategies to more hierarchical rule-governed strategies. Hence, learning disabled children and adolescents should be taught to efficiently organize linguistic information. (See Gillespie & Sitko, 1975, for a further review and implications of the literature in information processing as it relates to reading behavior of learning disabled children and adolescents.)

Intervention of Speech and Language Difficulties

Adequate development of instructional strategies in language (excluding speech disorders for the adolescent learning disabled) is lacking. Unfortunately, there is a dearth of carefully validated programming in all areas for children and adolescents designated as learning disabled. In addition, the results of

research concerning various instructional approaches have been conflicting, and many studies are criticized for improper designs (Wiederholt, 1974). The efficacy of training specific language skills (e.g., those constructs of language exemplified by research and training with the ITPA) has not been sufficiently established (Hammill & Larson, 1974a; Sedlack & Weener, 1973). Nor has the relationship between training in language skills and school achievement been thoroughly examined (Hammill & Larson, 1974a; Sedlack & Weener, 1973). Hence, a discussion of instructional strategies in language for the adolescent learning disabled is clouded by many issues discussed previously in this paper. Moreover, the adolescent learning disabled may have such additional difficulties as socio-emotional problems (Gordon, 1970) and severe reading and spelling retardation (de Hirsch, 1963) which confound the training picture.

Educators frequently urge the development of early screening, identification, and intervention strategies for all language impaired children (e.g., Marge, 1972; Menskoff, 1974). Marge (1972) discusses this issue:

> The research and clinical evidence, moreover, is noticeably in favor of the efficacy of early intervention for all linguistically handicapped children. The 'wait and see policy' invariably has led to many unnecessary complications which enlarge the problem of providing an effective training program (p. 301).

Marge also presents an opposing view held by Lenneberg (1966) who advocates postponing language training until the child matures in language at his/her own rate. If language functioning is inadequate, special training is given at a later age. Lenneberg feels later training is more beneficial because the child has more social experiences and is capable of understanding the purpose for instruction.

Early intervention of language problems is favored by most special educators. There are many language programs now available commercially for handicapped children including the learning disabled. Several of these are based upon the

ITPA--the MWM Program for Developing Language Abilities (Minskoff, Wiseman, & Minskoff, 1972) and the Goal Program (Karnes, 1973). Remedial activities for use after diagnosis with the ITPA have been developed by Bush and Giles (1969), Karnes (1968), and Rupert (1971). Other language programs are the Peabody Language Development Kits (Dunn & Smith, 1965, 1966, 1967; Dunn & Horton, 1968), The Wilson Syntax Program (Wilson, 1972), and Distar (Englemann & Osborn, 1970). For a thorough review of language intervention programs, see Hammill and Bartel (1975).

Nature of Language Programs

Marge (1972) places language intervention programs in two broad categories: (1) diagnostic approaches--assess the status of the child's disability, attempt to determine etiology and prognosis, and suggest appropriate procedures for modifying the child's linguistic behavior; and (2) training methods--help the child attain language function appropriate for his/her age (p. 93).

Many language programs in learning disabilities appear in the former category. Educators attempt to determine the etiology of child's language disorder (brain damage, perceptual impairment, and so forth). The cause then determines the nature of the training program. For example, if the child is found to be brain damaged, supposed language correlated activities in such categories as auditory and visual perception and perceptual motor skills may be included in the language program. However, the determination of etiology may not be an effective means of developing language programs (Marge, 1972; Zedler, 1972). If children are placed in a category, e.g., learning disabled--language programs developed for them may assume that uniformity exists between individuals in language behaviors (Zedler, 1972). As noted earlier, learning disabled children typically display heterogeneity in learning behaviors.

A second approach to language disorders is to determine the exact nature of the child's or adolescent's linguistic behaviors. The ITPA, and programs based on its subtests, were attempts by Kirk and his associates to assess and program for the intra-individual differences of the child. While the concept is admirable, the theoretical constructs of the ITPA have been criticized for not including current findings in language (Sitko & Semmel, 1973). Further research in the field will hopefully yield data that will allow the programmer to ascertain the linguistic startegies of the child or adolescent and provide a variety of alternatives for intervention.

Adolescents and Language Intervention

Although language intervention of learning disabled adolescents at the secondary level has been proposed by several learning disabilities specialists (Bailey, 1975; deHirsch, 1963; Drake, 1970; Giles, 1975; Lyness, 1973; Wiig & Semel, 1975), the emphasis remains on early intervention. In addition, the acquisition of language and perceptual skills beyond a certain age has been questioned (Bannatyne, 1971). Wepman et al. (1975) differentiates between intervention before and after age 12. Before adolescence, the programs are developmental; after adolescence they are compensatory. According to Wepman et al., the adolescent should be taught to use his/her best skills in coping with the academic demands of the secondary school programs.

The present authors feel language programs for adolescents should be developed as thoroughly as those at the elementary level. Although a great deal of language maturity is relatively achieved at four years of age, children with language difficulties continue to develop language skills into their midteens if the nature of their language disorder is severe (Menyuk, 1971).

According to several investigators of language, the language development of children with language difficulties is not qualitatively different from that of normal children. Rather, development is merely slowed (Fygetakis & Ingram, 1973; Morehead & Ingram, 1970; Sitko & Semmel, 1973). In particular, developmental lags in learning disabled adolescents' language have been reported by Wiig and Semel (1975).

In our opinion, if the adolescent learning disabled is developmentally behind his/her peers, a language program that has adequately task analyzed the linguistic skills of the adolescent should be used. In fact, recent investigators advocate task analysis as an efficient methodological approach for improving language and other instruction with learning disabled individuals (Bijou, 1970; Lloyd, 1975; Siegal, 1972; Ysseldyke & Salvia, 1974). Matching instructional strategies to the needs of the adolescents with language difficulties should extend beyond formal test results. As stated, the efficacy of test-related programs in relation to academic gains has been questioned. In addition, such test related programs involve the development of instructional decisions based on testing that occurs outside the environment or curriculum found in the classroom or secondary program. Because of the variability of settings and needs, it is impossible to use an educational program appropriate for all interventions. Solutions to educational problems are most often situationally specific.

As an alternative to global assessment measurements, we propose using a task analytic approach. Such an approach should consider the child, teacher, material, and situational variables. In task analysis, the educator analyzes the steps required to complete the task as well as the entry level of the student. Instruction begins where the student has been assessed to be on the skill continua. At present, a knowledge of the interaction of the adolescent's language capabilities with the content being offered, the manner of presentation, motivational factors, and so forth are not known.

More research is needed to determine the developmental stages of the language of adolescents. More research is needed on qualitative rather than quantitative differences in language processing between adolescents with adequate language skills and those with language difficulties.

Furthermore, educational personnel must form teams to view educational programming as a problem-solving or decision-making process. The teacher should stand at the center of the process. If programming is to be fully implemented, the teacher should be given the opportunity to engage in the decision-making process. A systematic approach to programming should be used. Because of the variability in settings and needs, it is impossible to predict an appropriate educational strategy without consideration of the total learning environment. Most often, solutions to problems are situationally dependent. Therefore, it is imperative that educational personnel be skilled in the process of decision-making or problem solving. One such approach to decision-making has recently been formulated by the present authors (Gillespie & Sitko, 1974, 1975). This diagnostic teaching approach stresses the importance of training teachers to be effective organizers of instruction and child-oriented decision makers to maximize children's and/or adolescent's use of efficient information-processing abilities.

Conclusions

Research on language behavior of both learning disabled children and adolescents presents a wide range of linguistic and speech deficits. With the scarcity of research devoted to the language difficulties of the learning disabled,there is little to guide educational personnel in developing individualized instructional strategies in speech and language. At best, the results of the research reviewed may provide only hypotheses or "in the ballpark hunches" which can be used in finding solutions to an individual learning disabled child's or adolescent's language difficulty in the classroom. Little attention has been focused on how the environmental and organismic variables studied in basic research affect the complex types of language-oriented learning and processing found in the classroom. Reliable, valid, and educationally relevant measures of adolescents' language competencies do not exist.

We are left instead with many norm-referenced global measures of language aptitudes with modest predictive validity and virtually no diagnostic validity. Only a limited range of standardized instruments exists for the assessment of language, especially for adolescents. Many of these are based on doctrinaire, inadequately researched theories of learning disabilities. Moreover, there is a dearth of criterion-referenced instruments in language for the adolescent.

Comparison studies conducted to determine language characteristics of learning disabled children and adolescents typically group individuals in a certain manner. Categorizing in most cases leads to stereotyping, and group characteristics are ascribed to individuals (Reynolds & Balow, 1972). Often, most of these ascribed language characteristics are communicated to educators without considering the interaction among such variables as educational settings, teacher preparation, experiental background, social-cultural factors, and emotional

adjustment. If programming is to be beneficial, the interaction of the individual with his/her total environment must be considered. If language assessment for the adolescent learning disabled is to be meaningful, more reliable, valid language measures reflecting current linguistic developments and normed or specific to adolescent populations should be constructed. In addition, assessment should be related to the purposes for which the adolescent has been referred. Language assessment should not be used to categorize or place the adolescent, but rather to enhance the adolescent's learning potential and achievement. The main concern should be precise individual, in situ task analytic assessment followed by the selection of instructional alternatives that take into consideration the needs of individual and situational factors.

For example, more attention must be given to inter- and intra-individual differences of learning disabled adolescents. Even if we had rich resources in instrumentation, inter-and intra-learner variability among children and adolescents with learning and language difficulties is so great that tests have limited value in instructional design. Although diagnostic tests have been constructed to isolate variability within individuals, this technique does not consider in situ assessment. Hence, one of the biggest challenges of a language-assessment program is to coordinate its objectives with the behavioral characteristics and linguistic needs of the learning disabled child or adolescent.

In general, there is little empirically-oriented and methodologically sound investigations dealing with speech and language difficulties with the adolescent learning disabled. Furthermore, the many gaps in related language research make generalization practically impossible. The literature is unclear as to the exact nature of the linguistic problems of the LD adolescent. Little progress has been made in the study of phonological, morphological, syntactic and semantic development of language in LD children and adolescents. Except for the excellent

research of Bartel, Drew, Freston, Goodglass, Menyuk, Rosenthal, Samuels, Semmel, Vogel, Wiig, and a few others, language research in general has not reflected or applied recent and exciting developments in contemporary linguistics, psycholinguistics, and cognitive psychology. Moreover, studies dealing with the language of populations labeled learning disabled reflect a wide variety of interpretations and assessments of language. Additional research is sorely needed in the receptive, integrative, and expressive or productive aspects of learning disabled children's and adolescent's oral and written language.

Future language research should explore the exact nature and extent of basic language and/or cognitive-processing strategies and language deficits among learning disabled children and adolescents in language-related academic learning situations. Evidence suggests that many of the language strategies exhibited by learning disabled children and adolescents are deficient and reflect primitive and inefficient levels of cognitive and linguistic information processing. Viable models similar to Samuels' (1973) information-processing model of associational learning are definitely needed to stimulate and guide investigations of variables and factors associated with individual differences in language behavior--including reading and writing--and language development. It is fruitless to prescribe language remediation and training programs for the learning disabled until we have some understanding of the basic processes underlying their language and speech difficulties. We need to determine if linguistic problems associated with learning disabilities are due to performance variables (short-term memory deficits, attentional deficits, social-cultural-situational factors, motivation), competence variables (lack of knowledge of specific grammatical, phonological, and/or semantic relationships or rules), or both competence and performance variables.

As was the case with language assessment and characteristics of language behavior, evidence of effective language programming of the adolescent learning disabled is lacking. Recently, more attention has been directed toward developing effective instructional strategies for learning disabled adolescents who lack basic language skills. Early screening, identification, and intervention of language problems are favored by special educators. While interest in developing efficient language instructional strategies in language disabilities is increasing, the promulgation of materials and programs not carefully validated with adolescents is occurring. The adaptation or adoption of assessment techniques and instructional strategies with questionable efficacy with younger learning disabled children is not the solution to programming for adolescents.

The present authors' orientation to language programming was discussed. This approach is based on in situ assessment of the child's or adolescent's linguistic strategies and a task-analytic approach to the development of linguistic skills that consider the interaction of teacher, child, material and situational variables. In addition, the approach views educational programming as a systematic problem-solving or decision-making process. It also stresses the importance of training teachers to be effective organizers of instruction, and child-oriented decision makers to maximize children's and/or adolescent's use of efficient information-processing abilities. In our opinion, teachers who are effectively trained in decision-making competencies will more sufficiently meet the individual linguistic instructional needs of learning disabled children and/or adolescents.

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